The Examiner's objection to the drawings is believed fully met by the amendments proposed in Appendix B. By these amendments switches are added between the multiple coils indicated. This amendment is supported by the specification on page 17, lines 10-20. No new matter is added.

The Abstract of the Disclosure is amended in accordance with the Examiner's comments.

Claims 16 and 17 are rewritten in proper Markush format. Claims 33 and 42 are cancelled.

The third conducting layer may be applied as part of the second conducting layer as shown in figure 11a. However, as shown in figure 12, the second and third layers may be manufactured separately. Further, as indicated in figure 8a, the second and third layers may be applied at different levels. The wording of new claim 43 is therefore supported in the specification. Claim 7 is amended to reflect the proper antecedent basis for the words, "substrate insulating layer". Claims 16-18 are amended to remove the words "such as". Claim 28 is amended to refer to the "second capacitor electrode" for which there is a proper antecedent basis. Applicant submits that these amendments fully meet the Examiner's rejections based on 35USC112.

The Examiner has rejected prior claims 25-28,31,32, 34-37, 40 and 41 under 35USC102(b) based on the reference, Ishige et al, EP 0 725 408, referred to herein as Ishige. Further the Examiner has rejected prior claims 1-21,24,33, and 42 under 35USC103(a) based on the reference Tham, et al, U.S. Patent no.

6,049,702 in view of the cited reference Ishige. Applicant submits that new claims 43-49 and the related cancellation of claims 1 and 25 fully meet these rejections and accordingly the remaining dependent claims also define patentable subject matter. The Examiner is respectfully requested to reconsider the rejections based on the new claims, the amended claims, and the remarks below.

The Invention

As described in new independent claims 43 and 45, the invention of this application is directed to an integrated micromechanical resonator which includes an inductor and a tunable capacitor the capacitor has a moveable electrode which is flexible. The resonator is suspended and a dielectric insulating layer separates the electrodes from galvanic contact. This combination provides a large tuning range.

Discussion of the Cited References

The Examiner relies primarily on the disclosure of the reference Ishige. The disclosure of Ishige shows a variety of structures for a micromechanical variable capacitor constructed with semiconductor fabrication techniques. These structures may be operated with a low voltage by setting the distance between the moveable and driving electrodes with flexibility (see column 16, lines 16-24). The reference Ishige does not show an integrated RF resonator with a suspended structure. There is also no disclosure of the use of a dielectric insulating layer in the tunable capacitor. The control and active electrodes of the variable capacitor of this invention are constructed as separated electrodes on a single conductive layer. This provides a large range of capacitance while the active electrode gap is smaller than the gap at the tuning electrodes.

The Issue of Anticipation

It is well settled that a claim is anticipated, "only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (See CHISOLM, Federal Circuit Guide, Pg. 1221).

> "...it must be shown that the reference contains all of the elements of the claims apart from irrelevant or merely extraneous variations, and the elements are arranged in the same way to achieve the same result which is asserted to be an inventive function..." 454 U.S. 1129 (1981)

The elements of the claim and their function and purpose within the claim must be reviewed in a manner similar to an infringement analysis. If the device described in the cited reference would not infringe if it was later, it will not anticipate if the reference is earlier.

Applying this standard to the device of the reference Ishige, it is observed that there is no dielectric layer as indicated in claim 45. Accordingly there would be no infringement. This is also true of the remaining claims dependent from claim 45. The reference Ishige, therefore, does not support a rejection based on anticipation, as contended by the Examiner.

The Issue of Obviousness

Amended claims 29 and 30 are dependent on new claim 45 and relate to the flexible support structure of the moveable electrode. The Examiner has rejected the prior claims under 35USC103(B) as obvious in view of Ishige. To a certain extent this issue is moot in view of the content of new claim 45,

however, applicant notes that the Examiner's contention, that it would be obvious to use a corrugated spring structure as the support for the moveable electrode, is unsupported in the cited art. The Examiner's unsupported statements are not dispositive of this issue without some corroboration. Since there is no apparent support for the Examiner's conclusions, the applicant is at a loss to effectively attack the basis of these conclusions. If such conclusions are based on the Examiner's personal knowledge, then Applicants request an affidavit under 37C.F.R., section 1.107(b) detailing the Examiner's reasoning.

The Examiner seeks to combine the disclosure of the '702 reference with that of Ishige as a basis for rendering certain of the claims obvious. The '702 reference describes a radio transceiver constructed using microelectromechanical techniques. This device, as pointed out by the Examiner, employs tuned inductors and capacitors. Into this complex structure, the Examiner inserts the variable capacitor of Ishige. Although these structures may be compatible electronically, each is constructed using semiconductor and microelectromechanical techniques. This creates a manufacturing problem in the combination of the disclosures as the various elements of each system is closely interrelated. Applicant, therefore submits that such a combination would not be readily executable and does not support the Examiner contention of obviousness.

The Applicants rely on the decision of the Board of Patent Appeals and Interferences in Ex parte Clapp, 227 USPQ 972, 973 (BPAI 1985) which states:

> **"To support the conclusion that the claimed combination is directed to obvious subject matter, either the references**

must expressly or impliedly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references."

The Examiner has presented only his unsupported opinion as a line of reasoning. Applicant submits that the Examiner has failed to establish a prima facie case under 35 USC 103a.

" In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification. The prior art must provide one of ordinary skill in the art the motivation to make the .... modification..." IN RE LALU, 747 F.2d 703

The message of the above cited case is clear namely, that there must be some teaching in the prior art indicating that the modification of the cited reference is desirable. The Examiner has not sustained his burden. The deposited strata of the respective devices would need to be entirely altered and redesigned to accommodate the combination. The only incentive to do this is obtained from the subject application.

Nevertheless, even if such a combination is permissible under the obviousness doctrine, the combined disclosures do not teach the elements of new claims 43 and 45.

SUMMARY

In view of the amendments to this application and the arguments stated above, Applicant submits that the claims under consideration contain patentable subject matter and favorable

action by the Examiner is respectfully requested.

The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

Aug 26, 2002

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service on the date indicated below as first class mail in an envelope addressed to the Commissioner of Patents, Washington, D.C. 20231.

Date: 8/26/02

Signature: Elaine F Buan
Person Making Deposit

Appendix A to Response in Application No.: 09/783,059

Amendment to the Abstract

~~(57)~~ **Abstract**

~~The invention relates to an arrangement for a~~An integrated tunable resonator for radio ~~and a method for producing the same. In particular the invention relates to~~includes an RF resonator ~~realised with~~having a micromechanical tunable capacitor with high Q- (quality factor) value ~~and a method for fabricating the same. In one particular embodiment of the arrangement in accordance with the invention the~~A first conducting layer (4) forms the first capacitor electrode (8), and/or the electrodes (9) to create the electrostatic force on ~~the~~ a movable micromechanical structure (2), and the interconnecting wire (10) between the inductor coil (1) and the capacitor electrode. This arrangement with thee ~~invention presents~~use of a dielectric insulating layer provides a substantial improvement to the linearity, power consumption, occupation space and reliability of RF resonator circuits.

MARKED UP CLAIMS

2.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that it comprises a substrate insulating layer between the substrate and the first conducting layer.

3.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the first conducting layer forms an interconnecting wire between the inductor coil and the capacitor electrode.

7.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that, the substrate ~~dielectric~~ insulating layer is arranged as a suspending structure for the capacitor electrode and the inductor coil.

8. (amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that, the gap between the capacitor electrodes is an air gap.

9. (amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the dielectric insulating layer is used as a sacrificial layer in creating the air gap.

12.(amended) An integrated tunable RF resonator according to Claim ~~10~~43, **characterized** in that the ~~a thin~~dielectric insulating layer on top of the capacitor electrode is silicon nitride.

13. (amended) An integrated tunable RF resonator according to Claim ~~10~~43, **characterized** in that ~~a thin~~the dielectric insulating layer on top of the capacitor electrode is polymer.

14.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the second capacitor electrode is the ground electrode.

15.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the conducting layer interconnecting the inductor and the capacitor and/or the second capacitor electrode is metal film.

16.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the material of which the first conducting layer is constructed is selected from the group ~~comprises any~~ consisting of the following materials:
- refractory metal, such as Mo, W or TiW,
- metal, such as Au or Cu, or
- doped electrode in bulk silicon.

17.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the material of which the second conducting layer is constructed is selected from the group consisting of ~~comprises any of~~ the following materials:
- metal, such as Au or Cu,
- polysilicon, or
- monocrystalline silicon.

18.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the third conducting layer is metal~~, such as Au or Cu~~.

19.(amended) An integrated tunable RF resonator according to claim 43 ~~19~~, **characterized** in that the third conducting layer is a electroplated layer with a substantially larger thickness than the thickness of the first and second conducting layers.

20.(amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the inductor coil is arranged with the second conducting layer and an electroplated metal layer on top of the conducting layer.

21. (amended) An integrated tunable RF resonator according to claim [1]43, **characterized** in that the inductor coil is arranged to be adjustable.

22. (amended) An integrated tunable RF resonator according to claim [21]43, **characterized** in that the inductor coil has several segments, and it is arranged to be adjustable by means to change the number of active segments in the coil.

23. (amended) An integrated tunable RF resonator according to claim [22]43, **characterized** in that the segments of the inductor coil are changed by a micro-electro-mechancial switch realized in the same fabrication process with capacitors and inductors.

24. (amended) An integrated tunable RF resonator according to claim ~~1~~43, **characterized** in that the inductor coil is a planar inductor coil.

27. (amended) A micromechanical tunable capacitor according to claim ~~25~~45, **characterized** in that a tuning signal is arranged to be fed through the tuning electrode.

28. (amended) A micromechanical tunable capacitor according to claim 45, **characterized** in that, ~~the~~ said second capacitor electrode is metal thin film.

29. (amended) A micromechanical tunable capacitor according to claim ~~25~~45, **characterized** in that the second capacitor electrode is folded and/or corrugated to at least two levels with respect to the first capacitor electrode.

30. (amended) A micromechanical tunable RF resonator according to claim 29, **characterized** in that the vertical portions of the folds and/or corrugates are fabricated thinner than the lateral portions of the second capacitor electrode.

31. (amended) A micromechanical tunable capacitor according to claim ~~25~~45, **characterized** in that, the said arrangement is on a substrate.

32. (amended) A micromechanical tunable capacitor according to claim 31, **characterized** in that, the said substrate is ~~glass, silicon, GaAs, or any other~~a semiconductor material.